The lab is due by 4pm on October 31, 2016.

Adding, subtracting, and multiplying a matrix by a number are operations that are fairly standard. Write the formula for the first cell in the matrix and then copy and paste the formula to the other cells. Multiplying matrices, `MMULT`, or computing the inverse of a matrix, `MINVERSE`, must be done with a command since the matrix needs to be treated as an array.

For Libre Office: If you do not use the function wizard, then you must enter the formula by hand. Once the formula is entered, do not press ENTER. Instead press `CTRL-SHIFT-ENTER`. This lets the spreadsheet know that you are doing an array calculation.

For Excel: Enter the command into the cell and press enter. Then Highlight the group of cells that will contain the answer. Then Press F2. Then `CTRL-SHIFT-ENTER`.

Problem 1. Use these matrices to do the following computations.

\[
A = \begin{bmatrix} 20 & 27 & -1 \\ -19 & -26 & 1 \\ 2 & 3 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 10 & 5 & 0 \\ 1 & 6 & 9 \\ 2 & 9 & 5 \end{bmatrix} \quad C = \begin{bmatrix} 15 & 25 & -5 \\ -8 & 10 & 1 \\ 7 & 35 & -4 \end{bmatrix} \quad D = \begin{bmatrix} 2 & 8 & -1 \\ 5 & 2 & 10 \\ 3 & 10 & 7 \end{bmatrix}
\]

Do the following computations. Be sure to clearly label your answers in the spreadsheet. You do not need to include these answers on this paper. If a computation is not possible, then be sure to mention this.

1. $2A + 3B - 6C$
2. $3D - 4A + 2B$
3. $AC$
4. $BD$
5. $ABC$
6. $A^{-1}$
7. $C^{-1}$
8. $A^{-1} * B$

Problem 2. Solve these systems of equations by using matrix inverses. Give your answers to at least 3 decimal digits. Do this problem on a different page of the spreadsheet.

\[
\begin{align*}
3x - 2y + 8z &= -60 \\
-2x + 2y + z &= 25 \\
x + 2y - 3z &= 75
\end{align*}
\]

Answer: $x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$ $z = \underline{\hspace{2cm}}$

\[
\begin{align*}
3x - 2y + 8z &= 49 \\
-2x + 2y + z &= -2 \\
x + 2y - 3z &= -16
\end{align*}
\]

Answer: $x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$ $z = \underline{\hspace{2cm}}$

\[
\begin{align*}
2x + y + 3z - 4w &= 9 \\
x + 2y + 3w &= 1 \\
x - 3z + w &= 10 \\
x - y - z - w &= 8
\end{align*}
\]

Answer: $x = \underline{\hspace{2cm}}$ $y = \underline{\hspace{2cm}}$ $z = \underline{\hspace{2cm}}$ $w = \underline{\hspace{2cm}}$

Once again e-mail me the spreadsheet showing how you solved these problems.